**Thesis Project Portfolio**

**Expanding Armrest Module for Electric Bariatric Chair**

(Technical Report)

**Beyond the 1%: A Telemedicine Strategy to Enhance Bariatric Surgery Adoption and Patient Follow-Through**

(STS Research Paper)

An Undergraduate Thesis

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**Table of Contents**

**Sociotechnical Synthesis**

Bariatric surgery is a form of specialty care that refers to a variety of procedures aimed at managing obesity and obesity-related conditions. 9.2% of adult Americans and 6.1% of children and adolescents have a BMI over 40, classifying them as severely obese, and once you reach this point, bariatric surgery is the most viable option to return to a normal BMI (Center for Metabolic and Weight Loss Surgery, n.d.). Only about 1% of those who are eligible for bariatric surgery actually go through with it, meaning most people who require the surgery to improve quality of life will not get the help they need (Chao et al., 2021). This disparity reflects a larger, systemic problem: the intersection of physical, logistical, and technological barriers that prevent patients from initiating and completing bariatric care. These barriers combine aspects of social and technical problems that now require integrated solutions. The technical project focuses on improving the physical infrastructure of bariatric care through the design of an adjustable electric bariatric chair module, while my STS research examines how telemedicine can be implemented to improve ease of access to bariatric care through systemic, logistical, and informational improvements.

The technical project tackled the problem of inadequate clinical infrastructure for bariatric patients, specifically in the lack of surgical seating and transport lacking accommodation to a wider range of body types. Current bariatric chairs can only expand up to 36-42 inches, which is not wide enough for some bariatric patients. This leads to complications before and after surgery regarding injuries like pressure sores, fluid buildup, and skin abrasions. There is also an increasing amount of severe obesity cases every year in the United States (Tiwari and Balasundaram, 2023). A solution to these problems would be to widen the chairs to allow for a more comfortable experience for the patient. The adjustable module will look to attach to current chair models to allow them to mechanically widen to up to 50 inches, which allows for larger body types, and then retract back so that it can fit through normal door frames. Our main design has the potential to allow a bariatric chair to expand outwards and support the

patient, but cannot be implemented in the scope of the current project due to time constraints and the fact that the chair is welded together at key joints.

The research problem addressed how telemedicine can be best implemented to expand access to bariatric care, using Everett Rogers' Diffusion of Innovations theory as a framework (Rogers,1962). As previously mentioned, only about 1% of those who are eligible for bariatric surgery actually go through with it, and telemedicine can be wielded to improve this percentage. I investigated how telehealth strategies, like virtual consultations, digital reminders, and provider-backed support groups, can be leveraged to improve patient engagement, reduce no-show rates, and combat misinformation and stigma. Through the use of literature review and the analysis of case studies, particularly through the acceleration of telemedicine via the COVID-19 pandemic, I found the telemedicine could significantly increase the likelihood that patients will attend consultations and follow through with surgery. I also found that the diffusion of telemedicine in bariatric care remains in the early-to-late majority phase, hindered by outdated infrastructure, inconsistent implementation, and societal hesitancy. I concluded that trust in providers, combined with flexible and private telehealth platforms, can serve as a powerful catalyst for adoption of the plan.

Together, these projects contributed to solving the general problem of limited access to bariatric care by offering two possible solutions in both the digital and physical dimensions of patient experience. While my work provides a clear path forward, particularly through the hybridization of telehealth outreach and adaptive in-person care,it also reveals the limits of single-point interventions. Future research should explore how integrated sociotechnical systems (e.g., combining patient data from telehealth with clinical equipment design feedback) can create a fully inclusive bariatric care pathway. Additionally, testing a prototype chair with the installed module in clinical settings and conducting patient-centered trials would be crucial next steps to ensure that technical innovations are truly meeting the needs of those they are intended to serve.

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